

**STRUCTURE AND METHOD FOR FABRICATING SEMICONDUCTOR
STRUCTURES AND DEVICES WITH OPTICAL PROCESSING LAYERS
UTILIZING THE FORMATION OF A COMPLIANT SUBSTRATE FOR
MATERIALS USED TO FORM THE SAME**

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Abstract of the Disclosure

High quality epitaxial layers of monocrystalline materials can be grown
overlying monocrystalline substrates such as large silicon wafers by forming a
10 compliant substrate for growing the monocrystalline layers. An accommodating buffer
layer comprises a layer of monocrystalline oxide spaced apart from the silicon wafer by
an amorphous interface layer of silicon oxide. The amorphous interface layer dissipates
strain and permits the growth of a high quality monocrystalline oxide accommodating
buffer layer. The accommodating buffer layer is lattice matched to both the underlying
15 silicon wafer and the overlying monocrystalline material layer. Any lattice mismatch
between the accommodating buffer layer and the underlying silicon substrate is taken
care of by the amorphous interface layer. Optical processing layers can be placed on
monocrystalline layers to process photons produced in the monocrystalline layers.